26/5/14
DIALOG(R)File 2:INSPEC

07797867 INSPEC Abstract Number: A2001-03-8115G-006, B2001-02-0520D-010
Title: High throughput optimizations of alloy and doped films based on ZnO and parallel synthesis of ZnO/Mg/sub x/Zn/sub 1-x/O quantum wells using combinatorial laser MBE toward ultraviolet laser
Author(s): Ohtomo, A.; Makino, T.; Tamura, K.; Matsumoto, Y.; Segawa, Y.; Tang, Z.; Wong, G.K.L.; Koinuma, H.; Kawasaki, M.
Author Affiliation: Dept. of Innovative & Eng. Mater., Tokyo Inst. of Technol., Yokohama, Japan
Journal: Proceedings of the SPIE - The International Society for Optical Engineering Conference Title: Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.3941 p.70-81
Publisher: SPIE-Int. Soc. Opt. Eng,
Publication Date: 2000 Country of Publication: USA
CODEN: PSISDG ISSN: 0277-786X
SICI: 0277-786X(2000)3941L.70:HTOA;1-O
Material Identity Number: C574-2000-134
U.S. Copyright Clearance Center Code: 0277-786X/2000/$15.00
Conference Title: Combinatorial and Composition Spread Techniques in Materials and Device Development
Conference Sponsor: SPIE
Conference Date: 26 Jan. 2000 Conference Location: San Jose, CA, USA
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Experimental (X)
Abstract: We report high-throughput optimizations for various material parameters of MgZn/sub 1-x/O and Zn/sub 1-x/Cd/sub x/O alloy films, Al-doped ZnO films, Mg/sub x/Zn/sub 1-x/O/ZnO single quantum wells and superlattice structures using combinatorial laser MBE. Combinatorial chips including nine thin film pixels were grown on lattice-matched ScAlMgO/sub 4/ (0001) substrates by switching the mask patterns and targets during pulsed laser deposition. (25 Refs)
Subfile: A B
Descriptors: aluminium; cadmium compounds; electrical conductivity; energy gap; excitons; II-VI semiconductors; magnesium compounds; masks; molecular beam epitaxial growth; photoluminescence; pulsed laser deposition ; semiconductor growth; semiconductor quantum wells; semiconductor superlattices; semiconductor thin films; stimulated emission; wide band gap semiconductors; zinc compounds
Identifiers: high throughput optimization; alloy films; doped films; ZnO; ZnO/Mg/sub x/Zn/sub 1-x/O quantum wells; combinatorial laser MBE; ultraviolet laser; high-throughput optimization; material parameters; MgZn/sub 1-x/O; Zn/sub 1-x/Cd/sub x/O alloy films; Al-doped ZnO films; Mg/sub x/Zn/sub 1-x/O/ZnO single quantum wells; superlattice structures; thin film pixels; lattice-matched ScAlMgO/sub 4/ (0001) substrates; mask patterns; targets; pulsed laser deposition; photoluminescence; excitonic stimulated emission; 87 K; 3 to 3.6 eV; 3E3 to 2E3 S/cm; 100 C; ScAlMgO/sub 4/; ZnO-MgZnO; ZnCdO; ZnO:Al
Class Codes: A8115G (Vacuum deposition); A7855E (Photoluminescence in II-VI and III-V semiconductors); A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A6865 (Low-dimensional structures: growth, structure and nonelectronic properties) ; A6855 (Thin film growth, structure, and epitaxy); A4262A (Laser materials processing); A8115I (Pulsed laser deposition); A7135 (Excitons and related phenomena); A7845 (Stimulated emission (condensed matter));

ZnO/MgZnO QW's.

26/5/16
DIALOG(R)File 2:INSPEC

07610161 INSPEC Abstract Number: A2000-14-8115G-022, B2000-07-0520D-050
Title: Plasma-assisted molecular beam epitaxy for ZnO based II-VI semiconductor oxides and their heterostructures
Author(s): Yefan Chen; Hang-Ju Ko; Soon-Ku Hong; Sekiuchi, T.; Yao, T.; Segawa, Y.
Author Affiliation: Inst. of Mater. Res., Tohoku Univ., Sendai, Japan
Journal: Journal of Vacuum Science & Technology B (Microelectronics and Nanometer Structures) Conference Title: J. Vac. Sci. Technol. B, Microelectron. Nanometer Struct. (USA) vol.18, no.3 p.1514-17
Publisher: AIP for American Vacuum Soc,
Publication Date: May 2000 Country of Publication: USA
CODEN: JVTBD9 ISSN: 0734-211X
SICI: 0734-211X(200005)18:3L.1514:PAMB;1-5
Material Identity Number: C067-2000-003
U.S. Copyright Clearance Center Code: 0734-211X/2000/18(3)/1514(4)/$15.00
Conference Title: 18th North American Conference on Molecular Beam Epitaxy
Conference Date: 10-13 Oct. 1999 Conference Location: Banff, Alta., Canada
Document Number: S0734-211X(00)09303-3
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Experimental (X)
Abstract: Plasma-assisted molecular beam epitaxy of ZnO epilayers and MgZnO/ZnO heterostructures on Al/sub 2/O/sub 3/(0001) substrates is described. A thin MgO layer is employed as a buffer for ZnO. The influence of the buffer on the initial growth of ZnO is discussed with the corresponding reflection high-energy electron diffraction (RHEED) studies. We found that the MgO buffer promotes the lateral growth of ZnO, which results in two-dimensional growth. A 3*3 reconstruction is observed and the RHEED intensity oscillations are recorded. The RHEED oscillations have been used in situ to monitor and control the growth of MgZnO/ZnO heterostructures. MgZnO/ZnO single-quantum-well structures have been grown and studied by cathodoluminescence. (4 Refs)
Subfile: A B
Descriptors: cathodoluminescence; II-VI semiconductors; magnesium compounds; molecular beam epitaxial growth; plasma deposition; reflection high energy electron diffraction; semiconductor epitaxial layers; semiconductor growth; semiconductor heterojunctions; semiconductor quantum wells; zinc compounds
Identifiers: Il-VI semiconductor; plasma-assisted MBE; epilayers; heterostructures; Al/sub 2/O/sub 3/(0001) substrates; MgO buffer; RHEED; two-dimensional growth; 3*3 reconstruction; RHEED intensity oscillations; single-quantum-well structures; cathodoluminescence; MgZnO-ZnO; Al/sub 2/O/sub 3/
Class Codes: A8115G (Vacuum deposition); A7865K (Optical properties of III-V and II-VI semiconductors (thin films/low-dimensional structures)); A6855 (Thin film growth, structure, and epitaxy); A5275R (Plasma applications in manufacturing and materials processing); A6820 (Solid surface structure); A7860H (Cathodoluminescence, ionoluminescence (condensed matter)); A6865 (Low-dimensional structures: growth, structure and nonelectronic properties); B0520D (Vacuum deposition); B2530B (Semiconductor junctions); B2520D (II-VI and III-V semiconductors); B2530C (Semiconductor superlattices, quantum wells and related structures)

MgZnO/ZnO QW's.

26/5/12
DIALOG(R)File 2:INSPEC

08195684 INSPEC Abstract Number: A2002-07-8115I-022, B2002-04-0520H-014
Title: Growth of ZnO/MgZnO superlattice on sapphire
Author(s): Muth, J.F.; Teng, C.W.; Sharma, A.K.; Kvit, A.; Kolbas, R.M.; Narayan, J.
Author Affiliation: Dept. of Electr. & Comput. Eng., North Carolina State Univ., Raleigh, NC, USA
Conference Title: Materials Science of Novel Oxide-Based Electronics. Symposium. (Materials Research Society Symposium Proceedings Vol.623) p. 353-8
Editor(s): Ginley, D.S.; Perkins, J.D.; Kawazoe, H.; Newns, D.M.; Kozyrev, A.B.
Publisher: Mater. Res. Soc, Warrendale, PA, USA
Publication Date: 2000 Country of Publication: USA xv+433 pp.
ISBN: 1 55899 531 5 Material Identity Number: XX-2001-00776
Conference Title: Materials Science of Novel Oxide-Based Electronics. Symposium
Conference Date: 24-27 April 2000 Conference Location: San Francisco, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Experimental (X)
Abstract: The optical and structural properties of ZnO/MgZnO superlattices were investigated by transmission electron microscope, transmission measurement and photoluminescence. The uncoupled wells ranged in thickness from ~30 AA to 75 AA. Modulation of the Mg content was observed in Z-contrast TEM indicating the alloy composition was periodic. The density of stacking faults in the superlattice was extremely high, however the photoluminescence in the narrowest well case was blue shifted, and substantially brighter than comparable bulk layers of ZnO and MgZnO indicating that the emission was enhanced. Excitonic features were observed in the optical absorption spectra and also revealed that diffusion of Mg from the barrier layers into the well was occurring. (6 Refs)
Subfile: A B
Descriptors: diffusion; excitons; II-VI semiconductors; light transmission; magnesium compounds; photoluminescence; pulsed laser deposition; semiconductor growth; semiconductor superlattices; spectral line shift; stacking faults; transmission electron microscopy; zinc compounds
Identifiers: ZnO/MgZnO superlattice; sapphire; growth; structural properties; optical properties; transmission electron microscope; transmission measurement; photoluminescence; uncoupled wells; Mg content; Z-contrast TEM; alloy composition; stacking faults; blue shift; excitonic features; optical absorption spectra; Mg diffusion; barrier layers; ZnO-MgZnO; Al/sub 2/O/sub 3/
Class Codes: A8115I (Pulsed laser deposition); A6865 (Low-dimensional structures: growth, structure and nonelectronic properties); A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A7135 (Excitons and related phenomena) ; B0520H (Pulsed laser deposition); B2530C (Semiconductor superlattices, quantum wells and related structures)
Chemical Indexing:
ZnO-MgZnO int - MgZnO int - ZnO int - Mg int - Zn int - O int - MgZnO ss - Mg ss - Zn ss - O ss - ZnO bin - Zn bin - O bin (Elements - 2,3,3)
Al2O3 sur - Al2 sur - Al sur - O3 sur - O sur - Al2O3 bin - Al2 bin - Al bin - O3 bin - O bin (Elements - 2)

26/5/11
DIALOG(R)File 2:INSPEC

08195685 INSPEC Abstract Number: A2002-07-8115I-023, B2002-04-0520H-015
Title: Single quantum well heterostructures of MgZnO/ZnO/MgZnO on c-plane sapphire
Author(s): Choopun, S.; Chalk, D.M.; Yang, W.; Vispute, R.D.; Ogale, S.B.; Sharma, R.P.; Venkatesan, T.
Author Affiliation: Dept. of Phys., Maryland Univ., College Park, MD, USA
Conference Title: Materials Science of Novel Oxide-Based Electronics. Symposium. (Materials Research Society Symposium Proceedings Vol.623) p. 359-64
Editor(s): Ginley, D.S.; Perkins, J.D.; Kawazoe, H.; Newns, D.M.; Kozyrev, A.B.
Publisher: Mater. Res. Soc, Warrendale, PA, USA
Publication Date: 2000 Country of Publication: USA xv+433 pp.
ISBN: 1 55899 531 5 Material Identity Number: XX-2001-00776
Conference Title: Materials Science of Novel Oxide-Based Electronics. Symposium
Conference Date: 24-27 April 2000 Conference Location: San Francisco, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Experimental (X)
Abstract: The single quantum well heterostructures of MgZnO/ZnO/MgZnO were grown on c-plane sapphire substrate by pulsed laser deposition. The well width was varied from 10 nm to 40 nm by controlling the deposition rate via number of laser pulsed on ZnO target. Using photoluminescence spectroscopy, we have observed a blue shift with respect to a thick ZnO reference sample when the well width was decreased. These results were fitted with calculations based on the simple square well model using the appropriate electron and holes effective masses. The quantized-energy and band offset as a function of well width, growth conditions, interface roughness, and possible quantum size effects on the quantum wells are discussed. (10 Refs)
Subfile: A B
Descriptors: effective mass; II-VI semiconductors; interface roughness; magnesium compounds; photoluminescence; pulsed laser deposition; semiconductor quantum wells; spectral line shift; zinc compounds
Identifiers: single quantum well heterostructures; c-plane sapphire substrate; pulsed laser deposition; well width; deposition rate; photoluminescence; blue shift; square well model; effective masses; band offset; interface roughness; quantum size effects; MgZnO-ZnO-MgZnO; Al/sub 2/O/sub 3/
Class Codes: A8115I (Pulsed laser deposition); A6865 (Low-dimensional structures: growth, structure and nonelectronic properties); A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A7855E (Photoluminescence in II-VI and III-V semiconductors); A7125J (Effective mass and g-factors (condensed matter electronic structure)); A6848 (Solid-solid interfaces); B0520H (Pulsed laser deposition); B2520D (II-VI and III-V semiconductors); B2530C (Semiconductor superlattices, quantum wells and related structures)
Chemical Indexing:
MgZnO-ZnO-MgZnO int - MgZnO int - ZnO int - Mg int - Zn int - O int - MgZnO ss - Mg ss - Zn ss - O ss - ZnO bin - Zn bin - O bin (Elements - 3,2,3,3)
Al2O3 sur - Al2 sur - Al sur - O3 sur - O sur - Al2O3 bin - Al2 bin - Al bin - O3 bin - O bin (Elements - 2)

26/5/10
DIALOG(R)File 2:INSPEC

08195728 INSPEC Abstract Number: A2002-07-6865-036, B2002-04-0520H-019
Title: Growth of ZnO/MgZnO superlattice on sapphire
Author(s): Muth, J.F.; Teng, C.W.; Sharma, A.K.; Kvit, A.; Kolbas, R.M.; Narayan, J.
Author Affiliation: Dept. of Electr. & Comput. Eng., North Carolina State Univ., Raleigh, NC, USA
Conference Title: Laser-Solid Interactions for Materials Processing, Symposium (Materials Research Society Symposium Proceedings Vol.617) p. J6.7.1-6
Editor(s): Kumar, D.; Norton, D.P.; Lee, C.B.; Ebihara, K.; Xi, X.X.
Publisher: Mater. Res. Soc, Warrendale, PA, USA
Publication Date: 2000 Country of Publication: USA xi+256 pp.
ISBN: 1 55899 525 0 Material Identity Number: XX-2001-01014
Conference Title: Laser-Solid Interactions for Materials Processing. Symposium
Conference Date: 25-27 April 2000 Conference Location: San Francisco, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Experimental (X)
Abstract: The optical and structural properties of ZnO/MgZnO superlattices were investigated by transmission electron microscope, transmission measurement and photoluminescence. The uncoupled wells ranged in thickness from ~30 AA to 75 AA. Modulation of the Mg content was observed in Z-contrast TEM indicating the alloy composition was periodic. The density of stacking faults in the superlattice was extremely high, however the photoluminescence in the narrowest well case was blue shifted, and substantially brighter than comparable bulk layers of ZnO and MgZnO indicating that the emission was enhanced. Excitonic features were observed in the optical absorption spectra and also revealed that diffusion of Mg from the barrier layers into the well was occurring. (6 Refs)
Subfile: A B A B
Descriptors: dislocation density; excitons; II-VI semiconductors; magnesium compounds; photoluminescence; pulsed laser deposition; semiconductor growth; semiconductor superlattices; spectral line shift; stacking faults; stoichiometry; transmission electron microscopy; wide band gap semiconductors; zinc compounds
Identifiers: ZnO/MgZnO superlattice; sapphire; optical properties; structural properties; transmission electron microscope; transmission measurement; photoluminescence; uncoupled wells; Mg content modulation; Z-contrast TEM; periodic alloy composition; stacking faults density; blue shift; optical absorption spectra; Mg diffusion; ZnO-MgZnO; Al/sub 2/O/sub 3/
Class Codes: A6865 (Low-dimensional structures: growth, structure and nonelectronic properties); A8115I (Pulsed laser deposition); A7855E (Photoluminescence in II-VI and III-V semiconductors); A6480E (Stoichiometry and homogeneity); A6170P (Stacking faults, stacking fault tetrahedra and other planar or extended defects); A6170J (Etch pits, decoration, transmission electron-microscopy and other direct observations of dislocations); B0520H (Pulsed laser deposition); A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); B2520D (II-VI and III-V semiconductors); B2530C (Semiconductor superlattices, quantum wells and related structures)
Chemical Indexing:
ZnO-MgZnO int - MgZnO int - ZnO int - Mg int - Zn int - O int - MgZnO ss

24/5/7
DIALOG(R)File 2:INSPEC

06955664 INSPEC Abstract Number: A9815-7865-078, B9808-4260D-013
Title: Double heterostructure based on ZnO and Mg/sub x/Zn/sub 1-x/O
Author(s): Ohtomo, A.; Kawasaki, M.; Koida, T.; Koinuma, H.; Sakurai, Y.; Yoshida, Y.; Sumiya, M.; Fuke, S.; Yasuda, T.; Segawa, Y.
Author Affiliation: Dept. of Innovative & Eng. Mater., Tokyo Inst. of Tech., Yokohama, Japan
Journal: Materials Science Forum Conference Title: Mater. Sci. Forum (Switzerland) vol.264-268, pt.2 p.1463-6
Publisher: Trans Tech Publications,
Publication Date: 1998 Country of Publication: Switzerland
CODEN: MSFOEP ISSN: 0255-5476
SICI: 0255-5476(1998)264/268:2L.1463:DHBM;1-R
Material Identity Number: H866-98008
Conference Title: Silicon Carbide, III-Nitrides and Related Materials. 7th International Conference
Conference Sponsor: Linkoping Univ.; ABB Asea Brown Boveri; Cree Res.; Okmetik Oy; Epigress AB; et al
Conference Date: 31 Aug.-5 Sept. 1997 Conference Location: Stockholm, Sweden
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Experimental (X)
Abstract: We propose a widegap semiconductor, Mg/sub x/Zn/sub 1-x/O, as a barrier layer for ultraviolet light emitting devices based on ZnO. Mg/sub x/Zn/sub 1-x/O single layer films and double heterostructures of Mg/sub x/Zn/sub 1-x/O/ZnO/Mg/sub x/Zn/sub 1-x/O were fabricated by pulsed laser deposition on sapphire (0001) substrates. The photoluminescence peak of Mg/sub x/Zn/sub 1-x/O shifted from 3.36 eV (x=0) to 3.87 eV (x=0.25) with increasing x. Epitaxial double heterostructures were successfully grown as verified by X-ray diffraction and secondary ion mass spectrometry. Clear exciton emission in double heterostructure indicates that this alloy system is promising for the light emitting devices. (6 Refs)
Subfile: A B
Descriptors: excitons; II-VI semiconductors; light emitting diodes; magnesium compounds; photoluminescence; pulsed laser deposition; secondary ion mass spectra; semiconductor epitaxial layers; wide band gap semiconductors; X-ray diffraction; zinc compounds
Identifiers: double heterostructure; Mg/sub x/Zn/sub 1-x/O; widegap semiconductor; ultraviolet light emitting devices; pulsed laser deposition; sapphire substrates; photoluminescence; X-ray diffraction; secondary ion mass spectrometry; exciton emission; 600 C; 4.2 K; MgZnO-ZnO; Al/sub 2/O/sub 3/
Class Codes: A7865J (Optical properties of nonmetallic thin films); A7135 (Excitons and related phenomena); A6865 (Layer structures, intercalation compounds and superlattices: growth, structure and nonelectronic properties); A7920N (Atom-, molecule-, and ion-surface impact); A8115I (Pulsed laser deposition); A7855D (Photoluminescence in tetrahedrally bonded nonmetals); B4260D (Light emitting diodes); B2520M (Other semiconductor materials)
Chemical Indexing:
MgZnO-ZnO int - MgZnO int - ZnO int - Mg int - Zn int - O int - MgZnO ss - Mg ss - Zn ss - O ss - ZnO bin - Zn bin - O bin (Elements - 3,2,3)
Al2O3 sur - Al2 sur - Al sur - O3 sur - O sur - Al2O3 bin - Al2 bin - Al bin - O3 bin - O bin (Elements - 2)
Numerical Indexing: temperature 8.73E+02 K; temperature 4.2E+00 K

MgZnO barriers in ZnO-based LED's.

26/5/18
DIALOG(R)File 2:INSPEC

07415859 INSPEC Abstract Number: A2000-01-4255P-032, B2000-01-4320J-033
Title: UV lasing of excitons in a ZnO thin film at room temperature
Author(s): Segawa, Y.
Author Affiliation: Photodynamics Res. Center, Inst. of Phys. & Chem. Res., Sendai, Japan
Conference Title: Proceedings of the Symposium on Light Emitting Devices for Optoelectronic Applications and Twenty-Eighth State-of-the-Art Program on Compound Semiconductors p.305-10
Editor(s): Hou, H.Q.; Sah, R.E.; Pearton, S.J.; Ren, F.; Wada, K.
Publisher: Electrochem. Soc, Pennington, NJ, USA
Publication Date: 1998 Country of Publication: USA xi+642 pp.
ISBN: 1 56677 194 3 Material Identity Number: XX-1999-02005
Conference Title: Proceedings of the Symposium on Light Emitting Devices for Optoelectronic Applications and Twenty-Eighth State-of-the-Art Program on Compound Semiconductors
Conference Date: 3-8 May 1998 Conference Location: San Diego, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Practical (P); Experimental (X)
Abstract: High-quality ZnO thin films were grown by laser MBE, and the lateral grain size in a 55 nm thick sample was about 50 nm. At room temperature, the exciton absorption peak and the photoluminescence peak had the same energy. Under high density excitation, an exciton-exciton collision process (p line) was observed. The intensity of the p line showed a very rapid increase with increase in the excitation power. Fine structures that came from the cavity mode of the laser were also observed. These facts suggest that exciton lasing was observed at room temperature. The band gap of Mg/sub x/Zn/sub 1-x/O was successfully controlled as verified by the photoluminescence peak-shift. The effect of quantum confinement of electrons and holes was observed in Mg/sub x/Zn/sub 1-x/O/ZnO multi-quantum-well structures. (6 Refs)
Subfile: A B
Descriptors: energy gap; excitons; fine structure; grain size; II-VI semiconductors; laser cavity resonators; laser deposition; magnesium compounds; molecular beam epitaxial growth; photoluminescence; semiconductor growth; semiconductor lasers; semiconductor quantum wells; semiconductor thin films; wide band gap semiconductors; zinc compounds
Identifiers: exciton UV lasing; ZnO thin film; laser MBE; lateral grain size; exciton absorption peak; photoluminescence peak; high density excitation; p-line exciton-exciton collision process; p-line intensity; excitation power; fine structures; laser cavity mode; exciton lasing; Mg/sub x/Zn/sub 1-x/O band gap; photoluminescence peak-shift; quantum confinement effect; Mg/sub x/Zn/sub 1-x/O/ZnO multi-quantum-well structures ; 55 nm; 50 nm; ZnO; MgZnO-ZnO
Class Codes: A4255P (Lasing action in semiconductors); A7135 (Excitons and related phenomena); A7865K (Optical properties of III-V and II-VI semiconductors (thin films/low-dimensional structures)); A7855E (Photoluminescence in II-VI and III-V semiconductors); A8115G (Vacuum deposition); B4320J (Semiconductor lasers); B2520E (Oxide and ferrite semiconductors); B4220 (Luminescent materials); B2530C (Semiconductor superlattices, quantum wells and related structures); B2520D (II-VI and III-V semiconductors); B0520D (Vacuum deposition)
Chemical Indexing:
ZnO int - Zn int - O int - ZnO bin - Zn bin - O bin (Elements - 2)
MgZnO-ZnO int - MgZnO int - ZnO int - Mg int - Zn int - O int - MgZnO ss

MgZnO/ZnO QW's.

L26 ANSWER 34 OF 57 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
ACCESSION NUMBER: 2004-529426 [51] WPIX
DOC. NO. NON-CPI: N2004-419688
DOC. NO. CPI: C2004-195107
TITLE: **Zinc oxide** group metal insulator semiconductor structured **light emitting** diode element has intrinsic type **zinc oxide** layer which is **doped** with p-type impurity at specific concentration.
DERWENT CLASS: L03 U11 U12
PATENT ASSIGNEE(S): (SHAF) SHARP KK
COUNTRY COUNT: 1
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
JP 2004193240	A	20040708	(200451)*		13	H01L033-00

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
JP 2004193240	A	JP 2002-357646	20021210

PRIORITY APPLN. INFO: JP 2002-357646 20021210
INT. PATENT CLASSIF.:
MAIN: H01L033-00
SECONDARY: H01L021-365
BASIC ABSTRACT:
JP2004193240 A UPAB: 20040810
NOVELTY - N-type **zinc oxide** layer (3) is provided in contact with an intrinsic type **zinc oxide** layer (4) which is **doped** with p-type impurity at a concentration less than 1 multiply 1019 cm-3, on a **gallium nitride** laminated sapphire substrate (1).
USE - **Zinc oxide** group metal insulator semiconductor structured **light emitting** diode element.
ADVANTAGE - Excellent **light emitting** property that produces neither output saturation nor wavelength shift to high output, is obtained.
DESCRIPTION OF DRAWING(S) - The figure shows a sectional view of the **zinc oxide** group metal insulator semiconductor structured **light emitting** diode element.
sapphire substrate 1
n-type **magnesium zinc oxide** layer 2
n-type **zinc oxide** layer 3
intrinsic type **zinc oxide** layer 4
n-type ohmic and pad electrodes 5
Dwg.1/7
FILE SEGMENT: CPI EPI
FIELD AVAILABILITY: AB; GI
MANUAL CODES: CPI: L04-C02B; L04-C12A; L04-E03A
EPI: U11-C02J1A; U11-C02J7; U12-A01A1B; U12-E01A2

5/5/7
DIALOG(R)File 2:INSPEC

08613155 INSPEC Abstract Number: A2003-12-7360L-015, B2003-06-2520D-031
Title: Control of optical and electrical properties of ZnO films for photovoltaic applications
Author(s): Hunger, R.; Iwata, K.; Fons, P.; Yamada, A.; Matsubara, K.; Niki, S.; Nakahara, K.; Takasu, H.
Author Affiliation: Energy Electron. Inst., Nat. Inst. of Adv. Ind. Sci. & Technol., Ibaraki, Japan
Conference Title: II-VI Compound Semiconductor Photovoltaic Materials. Symposium (Materials Research Society Symposium Proceedings Vol.668) p. H2.8.1-6
Editor(s): Birkmire, R.; Noufi, R.; Lincot, D.; Schock, H.-W.
Publisher: Mater. Res. Soc, Warrendale, PA, USA
Publication Date: 2001 Country of Publication: USA xv+570 pp.
ISBN: 1 55899 604 4 Material Identity Number: XX-2002-01855
Conference Title: II-VI Compound Semiconductor Photovoltaic Materials Symposium
Conference Date: 16-20 April 2001 Conference Location: San Francisco, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Experimental (X)
Abstract: ZnO films were grown by radical-source molecular beam epitaxy (RS-MBE) on sapphire and glass substrates, and they were characterized in terms of Hall mobility and optical transmission. Undoped ZnO films exhibit a low intrinsic defect density and optical properties close to bulk ZnO. By Ga doping, a resistance rho as low as 2 * 10/sup -4/ Omega cm could be achieved. Balancing high conductivity and low transmission losses due to free carrier absorption in the infrared, the optimum was obtained for rho =3.4 * 10/sup -4/ Omega cm, electron mobility mu /sub e/=37 cm/sup 2//Vs and an average transmission T of 96% in the wavelength range 400-1100 nm. Polycrystalline growth on glass yields slightly reduced but still good film quality (mu /sub e/=30 cm/sup 2//Vs, T=90%). By the incorporation of Mg, conducting Mg/sub 0.3/Zn/sub 0.7/O films with an increased band gap up to ~4 eV were realized. (14 Refs)
Subfile: A B
Descriptors: electrical conductivity; electrical resistivity; electron mobility; energy gap; Hall mobility; II-VI semiconductors; light transmission; molecular beam epitaxial growth; optical losses; semiconductor doping; semiconductor epitaxial layers; semiconductor growth; visible spectra; wide band gap semiconductors; zinc compounds
Identifiers: optical properties; electrical properties; photovoltaic applications; ZnO films; radial source molecular beam epitaxy; RS-MBE; sapphire; glass substrates; Hall mobility; optical transmission; defect density; resistivity; conductivity; transmission losses; free carrier absorption; electron mobility; polycrystalline growth; 3.4*10/sup -4/ ohmcm ; 400 to 1100 nm; Al/sub 2/O/sub 3/; ZnO:Ga; ZnO:Mg
Class Codes: A7360L (Electrical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A7220M (Galvanomagnetic and other magnetotransport effects (semiconductors/insulators)); A8115G (Vacuum deposition); A6855 (Thin film growth, structure, and epitaxy); A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A6170T (Doping and implantation of impurities); A7840G (Visible and ultraviolet spectra of II-VI and III-V semiconductors); B2520D (II-VI and III-V semiconductors); B0520D (Vacuum deposition)

mg doping of ZnO incr. band ga

5/5/8
DIALOG(R)File 2:INSPEC

08453721 INSPEC Abstract Number: A2002-24-6170N-010, B2002-12-2120-016
Title: Crystallographic and chemical control of the SEM-EBIC contrast at zinc oxide based varistor grain boundaries
Author(s): Leach, C.
Author Affiliation: Mater. Sci. Centre, Manchester Univ., UK
Conference Title: Microscopy of Semiconducting Materials 2001. Proceedings of the Royal Microscopical Society Conference p.583-6
Editor(s): Cullis, A.G.; Hutchinson, J.L.
Publisher: IOP Publishing, Bristol, UK
Publication Date: 2001 Country of Publication: UK xiv+610 pp.
ISBN: 0 7503 0818 4 Material Identity Number: XX-2001-00681
Conference Title: Proceedings of Royal Microscopical Society. Microscopy of Semiconducting Materials XII
Conference Date: 25-29 March 2001 Conference Location: Oxford, UK
Language: English Document Type: Conference Paper (PA)
Treatment: Experimental (X)
Abstract: SEM-EBIC studies have been carried out on two simplified varistor compositions to investigate barrier structures formed at individual grain boundaries. Both resistive and charge separation contrast effects were observed. The strength of the resistive contrast was found to vary with dopant, being stronger in the manganese-doped than in the antimony-doped material. EBIC contrast due to charge separation was observed at some interfaces in both samples. An asymmetry in EBIC contrast was found to be governed by the orientations of the grain boundary planes on either side of the interface. (11 Refs)
Subfile: A B
Descriptors: antimony; crystal orientation; crystal symmetry; diffusion barriers; EBIC; electrical resistivity; grain boundaries; II-VI semiconductors; interface structure; manganese; scanning electron microscopy; stoichiometry; varistors; wide band gap semiconductors; zinc compounds
Identifiers: crystallographic control; chemical control; SEM-EBIC contrast; zinc oxide based varistor grain boundaries; varistor compositions ; barrier structures; resistive contrast; charge separation contrast; manganese-doped material; antimony-doped material; interfaces; asymmetry; crystal orientations; ZnO:Mg; ZnO:Sb
Class Codes: A6170N (Grain and twin boundaries); A6848 (Solid-solid interfaces); A6150J (Crystal morphology and orientation); A6480E (Stoichiometry and homogeneity); A7280E (Electrical conductivity of II-VI and III-V semiconductors); A6150E (Crystal symmetry; models and space groups, and crystalline systems and classes); A7220F (Low-field transport and mobility; piezoresistance (semiconductors/insulators)); B2120 (Resistors); B2520D (II-VI and III-V semiconductors)
Chemical Indexing:
ZnO:Mg int - ZnO int - Mg int - Zn int - O int - ZnO:Mg ss - Mg ss - Zn ss - O ss - ZnO bin - Zn bin - O bin - Mg el - Mg dop (Elements - 2,1,3)
ZnO:Sb int - ZnO int - Sb int - Zn int - O int - ZnO:Sb ss - Sb ss - Zn ss - O ss - ZnO bin - Zn bin - O bin - Sb el - Sb dop (Elements - 2,1,3)

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DIALOG(R)File 2:INSPEC

08249575 INSPEC Abstract Number: A2002-11-7865K-024
Title: Optical properties of Mg/sub x/Zn/sub 1-x/O polycrystalline thin films prepared by sol-gel deposition method
Author(s): Dongxu Zhao; Yichun Liu; Dezhen Shen; Youming Lu; Jiying Zhang ; Fan, X.W.
Author Affiliation: Lab. of Excited State Processes, Acad. Sinica, Changchun, China
Journal: Journal of Sol-Gel Science and Technology vol.23, no.3 p. 231-4
Publisher: Kluwer Academic Publishers,
Publication Date: March 2002 Country of Publication: Netherlands
CODEN: JSGTEC ISSN: 0928-0707
SICI: 0928-0707(200203)23:3L.231:OPMP;1-Q
Material Identity Number: D214-2002-003
Language: English Document Type: Journal Paper (JP)
Treatment: Experimental (X)
Abstract: The Mg/sub x/Zn/sub 1-x/O alloy thin films were synthesized on Si and quartz substrates by the sol-gel deposition method. The transmittance and cathodoluminescence spectra of the Mg/sub 0.05/Zn/sub 0.95/O and Mg/sub 0.15/Zn/sub 0.85/O nanoparticle films were obtained at room temperature. It was found that the bandgap of Mg/sub 0.05/Zn/sub 0.95/O and Mg/sub 0.15/Zn/sub 0.85/O films is as large as 3.72 eV and 3.79 eV, respectively. The ultraviolet emission peaks are located at 376 nm and 370 nm, respectively, for the samples annealed at 600 degrees C. When the annealing temperature is elevated to 1000 degrees C, the bandgap decreases to 3.42 eV and an emission line related to the deep-level defect appears at 500 nm. The mechanism behind these phenomena is discussed. (14 Refs)

Again ΔE_g increases by Mg-doping of ZnO.

Subfile: A
Descriptors: annealing; cathodoluminescence; deep levels; energy gap; II-VI semiconductors; magnesium compounds; nanostructured materials; optical films; semiconductor thin films; sol-gel processing; spin coating; ultraviolet spectra; wide band gap semiconductors; zinc compounds
Identifiers: polycrystalline thin films; sol-gel deposition; optical properties; transmittance spectra; cathodoluminescence spectra; nanoparticle films; room temperature; large bandgap; ultraviolet emission peaks; annealing temperature; deep-level defect; wide band-gap semiconductor; double confinement; wurtzite structure; spin-coated; X-ray diffraction patterns; particle size; green emission; 600 C; 1000 C; 376 nm; 370 nm; 500 nm; ZnO:Mg; (ZnMg)O
Class Codes: A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A8115L (Deposition from liquid phases (melts and solutions)); A6855 (Thin film growth, structure, and epitaxy); A7860H (Cathodoluminescence, ionoluminescence (condensed matter)) ; A7155G (Impurity and defect levels in II-VI and III-V semiconductors); A7840G (Visible and ultraviolet spectra of II-VI and III-V semiconductors)
Chemical Indexing:
ZnO:Mg ss - Mg ss - Zn ss - O ss - ZnO bin - Zn bin - O bin - Mg el - Mg dop (Elements - 2,1,3)
ZnMgO ss - Mg ss - Zn ss - O ss (Elements - 3)
Numerical Indexing: temperature 8.73E+02 K; temperature 1.27E+03 K; wavelength 3.76E-07 m; wavelength 3.7E-07 m; wavelength 5.0E-07 m

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DIALOG(R)File 2:INSPEC

07271789 INSPEC Abstract Number: A1999-14-6820-006
Title: Periodic boundary quantum chemical study on ZnO ultra-violet laser emitting materials
Author(s): Oumi, Y.; Takara, H.; Ammal, S.S.C.; Kubo, M.; Teraishi, K.; Miyamoto, A.; Kawasaki, M.; Yoshimoto, M.; Koinuma, H.
Author Affiliation: Dept. of Mater. Chem., Tohoku Univ., Sendai, Japan
Journal: Japanese Journal of Applied Physics, Part 1 (Regular Papers, Short Notes & Review Papers) Conference Title: Jpn. J. Appl. Phys. 1, Regul. Pap. Short Notes Rev. Pap. (Japan) vol.38, no.4B p.2603-5
Publisher: Publication Office, Japanese Journal Appl. Phys,
Publication Date: April 1999 Country of Publication: Japan
CODEN: JAPNDE ISSN: 0021-4922
SICI: 0021-4922(199904)38:4BL.2603:PBQC;1-Y
Material Identity Number: F221-1999-010
Conference Title: Proceedings of the 1998 International Conference on Solid State Devices and Materials (SSDM'98)
Conference Date: 7-10 Sept. 1998 Conference Location: Hiroshima, Japan
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Theoretical (T)
Abstract: Periodic density functional calculations have been carried out to study the surface structure and polarity of ZnO and also for the band gap modulation of ZnO by doping with various metals such as Be, Mg, Ca, Sr and Co. Our calculations reveal that the relaxation energy for the [0001]O surface is higher than that of the [0001] Zn surface and hence the O-terminated surface can be easily reconstructed. The charge distribution analysis shows that the Zn atoms in the [0001] Zn surface are more metallic and hence this surface cannot form a stable structure. The calculations for the band gap modulation of ZnO suggest that Mg doping is effective for obtaining a wide band gap with a stable structure. (21 Refs)

$\left[\frac{\partial A E_g}{\partial [Mg]}\right]_{(ZnO)} > 0$

Subfile: A
Descriptors: density functional theory; energy gap; II-VI semiconductors; relaxation; surface states; surface structure; wide band gap semiconductors ; zinc compounds
Identifiers: periodic boundary quantum chemical study; ZnO UV laser emitting materials; periodic density functional calculations; surface structure; surface polarity; band gap modulation; doping effects; ZnO:Be; ZnO:Mg; ZnO:Ca; ZnO:Sr; ZnO:Co; surface relaxation energy; [0001]O surface; [0001]Zn surface; O-terminated surface reconstruction; charge distribution analysis; wide band gap; stable structure; ZnO
Class Codes: A6820 (Solid surface structure); A7125T (Electronic structure of crystalline semiconductor compounds and insulators); A7115M (Density functional theory, local density approximation (condensed matter electronic structure)); A7320A (Surface states, band structure, electron density of states)
Chemical Indexing:
ZnO sur - Zn sur - O sur - ZnO bin - Zn bin - O bin (Elements - 2)
ZnO:Be sur - ZnO sur - Be sur - Zn sur - O sur - ZnO:Be ss - Be ss - Zn ss - O ss - ZnO bin - Zn bin - O bin - Be el - Be dop (Elements - 2,1,3)
ZnO:Mg sur - ZnO sur - Mg sur - Zn sur - O sur - ZnO:Mg ss - Mg ss - Zn ss - O ss - ZnO bin - Zn bin - O bin - Mg el - Mg dop (Elements - 2,1,3)
ZnO:Ca sur - ZnO sur - Ca sur - Zn sur - O sur - ZnO:Ca ss - Ca ss - Zn ss - O ss - ZnO bin - Zn bin - O bin - Ca el - Ca dop (Elements - 2,1,3)
ZnO:Sr sur - ZnO sur - Sr sur - Zn sur - O sur - ZnO:Sr ss - Sr ss - Zn

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DIALOG(R)File 2:INSPEC

08370478 INSPEC Abstract Number: A2002-20-7865K-030, B2002-10-4340P-006
Title: Electro-optic property of ZnO:X (X=Li, Mg) thin films
Author(s): Nagata, T.; Shimura, T.; Ashida, A.; Fujimura, N.; Ito, T.
Author Affiliation: Dept. of Appl. Mater. Sci., Osaka Prefecture Univ., Japan
Journal: Journal of Crystal Growth Conference Title: J. Cryst. Growth (Netherlands) vol.237-239, no.1 p.533-7
Publisher: Elsevier,
Publication Date: April 2002 Country of Publication: Netherlands
CODEN: JCRGAE ISSN: 0022-0248
SICI: 0022-0248(200204)237/239:1L.533:EOPX;1-X
Material Identity Number: J037-2002-011
U.S. Copyright Clearance Center Code: 0022-0248/02/$22.00
Conference Title: Thirteenth International Conference on Crystal Growth in Conjunction with the Eleventh International Conference on Vapor Growth and Epitaxy
Conference Date: 30 July-4 Aug. 2001 Conference Location: Kyoto,Japan
Document Number: S0022-0248(01)01957-1
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Practical (P); Experimental (X)
Abstract: We have proposed an application of ZnO:X (X=Li, Mg, Ni, Al etc.) films for monolithic optical integrated circuits (OICs) (Mat. Res. Soc. Symp. Proc. 574 (1999) 317). Although non-doped ZnO has an electro-optic effect, it is only a Pockel's effect. The electro-optic effect of Pb(Zr,Ti)O/sub 3/ (Jpn. J. Appl. Phys. 34 (1995) 5091) is superior to ZnO, because that is caused by a non-linear Kerr effect. Our group demonstrated that Li-doped ZnO (ZnO:Li) films exhibited ferroelectric behavior (Appl. Phys. A, in press). ZnO with ferroelectricity should have a non-linear electro-optic effect against the applied voltage. In this paper, to design the ZnO monolithic slab waveguide for electro-optical switch, the refractive indices of top and bottom electrode layers and core layer were investigated. Then, electro-optical property of ZnO:Li,Mg films was evaluated, and the possibility of applying to an optical switch was also discussed. (13 Refs)
Subfile: A B
Descriptors: electro-optical effects; electro-optical switches; ferroelectric semiconductors; ferroelectric thin films; II-VI semiconductors; integrated optoelectronics; nonlinear optics; optical waveguides; refractive index; semiconductor thin films; zinc compounds
Identifiers: thin films; monolithic optical integrated circuits; electro-optic effect; ferroelectric behavior; monolithic slab waveguide; refractive indices; optical switch; nonlinear electro-optic effect; ZnO:Li; ZnO:Mg
Class Codes: A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A7820J (Electro-optical effects (condensed matter)); A7820D (Optical constants and parameters (condensed matter)); A7755 (Dielectric thin films); A7780 (Ferroelectricity and antiferroelectricity); A4280L (Optical waveguides and couplers); A4265P (Optical bistability, multistability and switching); B4340P (Optical bistability, multistability and switching); B2810F (Piezoelectric and ferroelectric materials); B4130 (Optical waveguides); B4270 (Integrated optoelectronics); B4150 (Electro-optical devices)
Chemical Indexing:

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DIALOG(R)File 2:INSPEC

08083241 INSPEC Abstract Number: A2001-24-4270-002, B2001-12-4110-013
Title: Ferroelectricity in Li-doped ZnO:X thin films and their application in optical switching devices
Author(s): Nagata, T.; Shimura, T.; Nakano, Y.; Ashida, A.; Fujimura, N.; Ito, T.
Author Affiliation: Dept. of Appl. Mater. Sci., Osaka Prefecture Univ., Japan
Journal: Japanese Journal of Applied Physics, Part 1 (Regular Papers, Short Notes & Review Papers) Conference Title: Jpn. J. Appl. Phys. 1, Regul. Pap. Short Notes Rev. Pap. (Japan) vol.40, no.9B p.5615-18
Publisher: Japan Soc. Appl. Phys,
Publication Date: Sept. 2001 Country of Publication: Japan
CODEN: JAPNDE ISSN: 0021-4922
SICI: 0021-4922(200109)40:9BL.5615:FDTF;1-A
Material Identity Number: F221-2001-018
Conference Title: 18th Meeting on Ferroelectric Materials and their Applications
Conference Date: 30 May-2 June 2001 Conference Location: Kyoto, Japan
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Applications (A); Experimental (X)
Abstract: We have proposed the application of ZnO:X (X=Li, Ni, Al etc.) films in monolithic optical integrated circuits (OICs). To realize the optical switching device, dielectric properties of ZnO:Li deposited on SiO/sub 2//p-Si were evaluated in detail. From the results of the frequency dependence of the dielectric permittivity and the loss, and the temperature dependence of ac conductivity at various frequencies, the existence of the mobile Li ion was confirmed. The pulsed C-V measurements revealed that not only the mobile Li ion but also the ferroelectricity of ZnO:Li contributed to the hysteresis in the normal C-V behavior. To determine the processes assumed to occur in the switching device structure, a prototype of the waveguide structure was fabricated. Although the relationship between the refractive indices of the core and clad layers satisfied the required condition for propagation, several processes such as interdiffusion of doped ions, band alignment and/or rearrangement of space charge when applying the bias voltage were also revealed. (14 Refs)
Subfile: A B
Descriptors: capacitance; dielectric hysteresis; dielectric losses; electrical conductivity; electro-optical switches; ferroelectric semiconductors; ferroelectric thin films; II-VI semiconductors; integrated optics; lithium; magnesium; optical films; optical waveguides; permittivity ; refractive index; semiconductor epitaxial layers; semiconductor switches; wide band gap semiconductors; zinc compounds
Identifiers: ferroelectricity; Li-doped ZnO thin films; optical switching devices; monolithic optical integrated circuits; OIC; frequency dependence; dielectric permittivity; dielectric loss; temperature dependence; ac conductivity; mobile Li ion; pulsed C-V measurements; C-V behavior hysteresis; waveguide structure; refractive index; doped ion interdiffusion ; band alignment; space charge rearrangement; ZnO:Li; ZnO:Li,Mg; Si-SiO/sub 2/; Si; ZnO:Al-ZnO:Li,Mg-ZnO:Al-Al/sub 2/O/sub 3/
Class Codes: A4270Y (Other optical materials); A7755 (Dielectric thin films); A7720 (Dielectric permittivity); A7740 (Dielectric loss and relaxation); A7780D (Ferroelectric domain structure and effects; hysteresis); A7360L (Electrical properties of II-VI and III-V semiconductors (thin

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DIALOG(R)File 2:INSPEC

07769462 INSPEC Abstract Number: A2001-01-6170T-001, B2001-01-2550B-005
Title: Exotic doping for ZnO thin films: possibility of monolithic optical integrated circuit
Author(s): Fujimura, N.; Shimura, T.; Wakano, T.; Ashida, A.; Ito, T.
Author Affiliation: Coll. of Eng., Osaka Prefecture Univ., Japan
Conference Title: Multicomponent Oxide Films for Electronics. Symposium p.317-22
Editor(s): Hawley, M.E.; Blank, D.H.A.; Eom, C.-B.; Schlom, D.G.; Streiffer, S.K.
Publisher: Mater. Res. Soc, Warrendale, PA, USA
Publication Date: 1999 Country of Publication: USA xiii+382 pp.
ISBN: 1 55899 481 5 Material Identity Number: XX-1999-03233
Conference Title: Multicomponent Oxide Films for Electronics. Symposium
Conference Date: 6-8 April 1999 Conference Location: San Francisco, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Applications (A); Practical (P); Experimental (X)
Abstract: We propose the application of ZnO:X (X=Li, Mg, N, In, Al, Mn, Gd, Yb etc.) films for a monolithic optical integrated circuit (OIC). Since ZnO exhibits excellent piezoelectric effect and has also electro-optic and nonlinear optic effects and the thin films are easily obtained, it has been studied as one of the important thin film waveguide materials especially for an acoustooptic device. In terms of electro-optic and nonlinear optic effects, however, LiNbO/sub 3/ or LiTaO/sub 3/ is superior to ZnO. The most important issue of thin film waveguide using such ferroelectrics is optical losses at the film/substrate interface and the film surface, because the process window to control the surface morphology is very narrow due to their high deposition temperature. Since ZnO can be grown at extremely low temperature, the roughness at the surface and the interface is expected to be minimized. This is the absolute requirement especially for waveguide using a blue or ultraviolet laser. Recently, ultraviolet lasing, ferroelectric and antiferromagnetic behaviors of ZnO doped with various exotic elements (exotic doping) have been reported. This paper discusses the OIC application of ZnO thin films doped with exotic elements. (16 Refs)
Subfile: A B
Descriptors: antiferromagnetic materials; electro-optical effects; ferroelectric semiconductors; II-VI semiconductors; integrated optoelectronics; nonlinear optics; piezoelectric semiconductors; piezoelectric thin films; semiconductor doping; semiconductor lasers; semiconductor thin films; surface structure; surface topography; wide band gap semiconductors; zinc compounds
Identifiers: exotic doping; ZnO thin films; monolithic optical integrated circuit; piezoelectric effect; electro-optic effects; nonlinear optic effects; thin film waveguide materials; acoustooptic device; ferroelectrics ; optical losses; film/substrate interface; roughness; ultraviolet lasing; ferroelectric behavior; antiferromagnetic behavior; ZnO:Li,Mg,N,In,Al,Mn,Gd,Yb
Class Codes: A6170T (Doping and implantation of impurities); A7865K (Optical properties of III-V and II-VI semiconductors (thin films/low-dimensional structures)); A7760 (Piezoelectricity and electrostriction); A6855 (Thin film growth, structure, and epitaxy); A7755 (Dielectric thin films); A7820J (Electro-optical effects (condensed matter)); A4265 (Nonlinear optics); A6820 (Solid surface structure);

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DIALOG(R)File 2:INSPEC

08349034 INSPEC Abstract Number: A2002-18-6865-044, B2002-09-0520H-016
Title: Phase separation in multiple ZnO/cubic-Mg/sub x/Zn/sub 1-x/O superlattice heterostructures observed via high resolution transmission electron microscopy
Author(s): Kvit, A.; Dusher, G.; Sharma, A.K.; Jin, C.; Narayan, J.; Muth, J.; Teng, C.W.
Author Affiliation: Dept. of Mater. Sci. & Eng., North Carolina State Univ., Raleigh, NC, USA
Conference Title: GaN and Related Alloys - 2000. Symposium (Materials Research Society Symposium Proceedings Vol.639) p.G6.50.1-6
Editor(s): Wetzel, C.; Shur, M.S.; Mishra, U.K.; Gil, B.; Kishino, K.
Publisher: Mater. Res. Soc, Warrendale, PA, USA
Publication Date: 2001 Country of Publication: USA xxvii+938 pp.
Material Identity Number: XX-2002-01106
Conference Title: GaN Related Alloys - 2000. Symposium
Conference Date: 27 Nov.-1 Dec. 2000 Conference Location: Boston, MA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Experimental (X)
Abstract: We have synthesized a ZnMgO alloy of wurtzite (Mg content 0.0=0.34} and cubic (Zn content 0.0=0.18) phases using nonequilibrium pulsed laser deposition. Epitaxial films of ZnMgO wurtzite structure have been grown on (0001) sapphire substrates. Using JEOL-2010 field-emission transmission electron microscope equipped with STEM and Gatan image filter, we can perform atomic structure, STEM-Z, electron energy loss spectroscopy and imaging simultaneously. Such studies on the ZnO/MgZnO superlattices provide the first direct evidence of phase-separation in the range 3 nm. (9 Refs)
Subfile: A B
Descriptors: electron energy loss spectra; II-VI semiconductors; magnesium compounds; phase separation; photoluminescence; pulsed laser deposition; scanning-transmission electron microscopy; semiconductor epitaxial layers; semiconductor growth; semiconductor superlattices; transmission electron microscopy; wide band gap semiconductors; zinc compounds
Identifiers: phase separation; multiple ZnO/cubic-Mg/sub x/Zn/sub 1-x/O superlattice heterostructures; high resolution transmission electron microscopy; nonequilibrium pulsed laser deposition; ZnMgO epitaxial films; sapphire substrates; Gatan image filter; electron energy loss spectroscopy; phase-separation; STEM; ZnO-MgZnO; Al/sub 2/O/sub 3/
Class Codes: A6865 (Low-dimensional structures: growth, structure and nonelectronic properties); A6475 (Solubility, segregation, and mixing); A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A8115I (Pulsed laser deposition); A7855E (Photoluminescence in II-VI and III-V semiconductors); B0520H (Pulsed laser deposition); B2530C (Semiconductor superlattices, quantum wells and related structures); B2520D (II-VI and III-V semiconductors)
Chemical Indexing:
ZnO-MgZnO int - MgZnO int - ZnO int - Mg int - Zn int - O int - MgZnO ss - Mg ss - Zn ss - O ss - ZnO bin - Zn bin - O bin (Elements - 2,3,3)
Al2O3 sur - Al2 sur - Al sur - O3 sur - O sur - Al2O3 bin - Al2 bin - Al bin - O3 bin - O bin (Elements - 2)

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DIALOG(R)File 2:INSPEC

08195685 INSPEC Abstract Number: A2002-07-8115I-023, B2002-04-0520H-015
Title: Single quantum well heterostructures of MgZnO/ZnO/MgZnO on c-plane sapphire
Author(s): Choopun, S.; Chalk, D.M.; Yang, W.; Vispute, R.D.; Ogale, S.B. ; Sharma, R.P.; Venkatesan, T.
Author Affiliation: Dept. of Phys., Maryland Univ., College Park, MD, USA
Conference Title: Materials Science of Novel Oxide-Based Electronics. Symposium. (Materials Research Society Symposium Proceedings Vol.623) p. 359-64
Editor(s): Ginley, D.S.; Perkins, J.D.; Kawazoe, H.; Newns, D.M.; Kozyrev, A.B.
Publisher: Mater. Res. Soc, Warrendale, PA, USA
Publication Date: 2000 Country of Publication: USA xv+433 pp.
ISBN: 1 55899 531 5 Material Identity Number: XX-2001-00776
Conference Title: Materials Science of Novel Oxide-Based Electronics. Symposium
Conference Date: 24-27 April 2000 Conference Location: San Francisco, CA, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Experimental (X)
Abstract: The single quantum well heterostructures of MgZnO/ZnO/MgZnO were grown on c-plane sapphire substrate by pulsed laser deposition. The well width was varied from 10 nm to 40 nm by controlling the deposition rate via number of laser pulsed on ZnO target. Using photoluminescence spectroscopy, we have observed a blue shift with respect to a thick ZnO reference sample when the well width was decreased. These results were fitted with calculations based on the simple square well model using the appropriate electron and holes effective masses. The quantized-energy and band offset as a function of well width, growth conditions, interface roughness, and possible quantum size effects on the quantum wells are discussed. (10 Refs)
Subfile: A B
Descriptors: effective mass; II-VI semiconductors; interface roughness; magnesium compounds; photoluminescence; pulsed laser deposition; semiconductor quantum wells; spectral line shift; zinc compounds
Identifiers: single quantum well heterostructures; c-plane sapphire substrate; pulsed laser deposition; well width; deposition rate; photoluminescence; blue shift; square well model; effective masses; band offset; interface roughness; quantum size effects; MgZnO-ZnO-MgZnO; Al/sub 2/O/sub 3/
Class Codes: A8115I (Pulsed laser deposition); A6865 (Low-dimensional structures: growth, structure and nonelectronic properties); A7865K (Optical properties of II-VI and III-V semiconductors (thin films/low-dimensional structures)); A7855E (Photoluminescence in II-VI and III-V semiconductors); A7125J (Effective mass and g-factors (condensed matter electronic structure)); A6848 (Solid-solid interfaces); B0520H (Pulsed laser deposition); B2520D (II-VI and III-V semiconductors); B2530C (Semiconductor superlattices, quantum wells and related structures)
Chemical Indexing:
MgZnO-ZnO-MgZnO int - MgZnO int - ZnO int - Mg int - Zn int - O int - MgZnO ss - Mg ss - Zn ss - O ss - ZnO bin - Zn bin - O bin (Elements - 3,2,3,3)
Al2O3 sur - Al2 sur - Al sur - O3 sur - O sur - Al2O3 bin - Al2 bin - Al bin - O3 bin - O bin (Elements - 2)